period seem to have been few, and of small dimensions in comparison with those of the coal.

Rising still higher in the vegetable kingdom, and arriving at unquestionable Gymnosperms, we find in the Devonian of Eastern America, and also, I believe, in that of Scotland and Germany, trunks which may be referred to Coniferæ. In the Middle and Upper Devonian these present the structure of modern Araucarian pines, or that modification of it belonging to the Carboniferous trees of the genus *Dadoxylon*. In the Lower Devonian we have what seems to be a simplification of the Coniferous structure, in the cylindrical wood-cells, marked only with spiral threads, found in the genus *Prototaxites*. These trees are very abundant as drift trunks in the Lower Devonian, down almost to its bottom beds, and sometimes attain to a diameter of three feet. Though of a structure so lax that it is comparable only with the youngest stems of ordinary Coniferæ, these trees must have been durable, and they are furnished both with medullary rays and rings of annual growth. Unfortunately we know nothing of their foliage or fruit. Fig. 4 represents a fragment of the wood of one of these trees, mineralised by infiltration of the tissues with silica, so that the structure is preserved.

But for one little fragment of wood, we should have had no indication of the existence in the Erian of any trees of higher organisation than the Conifers. This fragment, found by Professor Hall at Eighteen-mile Creek, Lake Erie, has the dotted vessels characteristic of ordinary Exogens, and unquestionably indicates a plant of the highest kind of organisation. Until confirmed by other facts, this discovery may be received with doubt, but I believe it can be relied on.

Our knowledge of the flora of the Upper Silurian is at present nearly in the same state with that of the Middle and Lower Devonian ten years ago. I know in the Upper Silurian of Canada but two species of *Psilophyton*, both apparently identical with Devonian forms. In England, besides the spore-cases known by the generic name *Pachytheca*, there exist in the collections of the Geological Survey fragments of wood and bark which I believe indicate two additional species. In Germany three or four species are known in rocks of this age. All of these plants appear to be Acrogens allied to Lycopodiaceæ. That these few species constitute the whole flora of the Upper Silurian we can scarcely believe. They occur in marine formations, and were probably drifted far from the somewhat limited land-surfaces which existed in the explored parts of the Upper Silurian areas. When we obtain access to deposits of this age formed in shallows or estuaries, we may hope to find a flora of greater richness; and, judging from present indications, not dissimilar from that of the Lower Devonian.

With the exception of some remains which I believe to be of very doubtful character, the Lower Silurian has as yet afforded no remains of land plants, and in North America, at least, this is very significant, inasmuch as we have, in the Potsdam sandstone, extensive sandy flats of this period, in which we might expect to find drifted trunks of trees, if such had existed. But the search is not hopeless, and we may yet find some estuary deposit on the margin of the ancient Laurentian continent, in whose beds the plants of that old land may occur.

Lastly, for reasons stated in a paper lately published in the Proceedings of the Geological Society, I believe that the extensive deposits of graphite, which exist in the Laurentian of Canada, are of vegetable origin, and possibly in part produced by land plants, as yet altogether unknown to us. If the Palæozoic was the age of Acrogens, the Eozoic may have been that of Anophytes and Thallophytes. Its plants may have consisted of gigantic mosses and lichens, presenting us with a phase of vegetable existence bearing the same relation to that of the Palæozoic, which the latter bears to that of more modern periods. But there is another and a more startling possibility, that the Laurentian may have been the period when vegetable life culminated on our planet, and existed in its highest and grandest forms, before it was brought into subordination to the higher life of the animal. The solution of these questions belongs to the future of geology, and opens up avenues not merely for speculation but also for practical work.

The above must be regarded as merely a sketch of the present aspect of the subject to which it relates. Details must be sought elsewhere.

J. W. DAWSON

NOTES

THE Royal Commission on Scientific Instruction and the Advancement of Science has already begun work. A second meeting was held on the 31st ult. at Devonshire House. Present: The Duke of Devonshire, K.G., chairman; the Marquis of Lansdowne; Sir J. Lubbock, Bart., M.P., F.R.S.; Sir J. P. Kay Shuttleworth, Bart.; Mr. B. Samuelson, M.P.; Dr. Sharpey, Sec. R.S.; Professor Huxley, F.R.S.; Dr. W. A. Miller, Treas. R.S.; and the secretary, Mr. J. Norman Lockyer, F.R.S.

A MEETING of the Syndicate appointed to consider the ways and means of establishing a Chair of Experimental Physics at Cambridge was held on Tuesday last.

WE may remind our Astronomical readers that the Visitation of the Royal Observatory at Greenwich takes place at 3 P.M. on Saturday.

THE annual meeting for the election of Fellows into the Royal Society was held this morning.

THE Geographical Society of Paris has bestowed a well-earned honour on our countryman, Mr. Alfred R. Wallace, by awarding him one of their gold medals for his researches in the Malay Archipelago.

AT the meeting of the French Academy, held on the 23rd ult., the following list of candidates for the place vacant by the death of Professor Magnus was presented by the Secret Committee:—1, Mr. Joule; 2, MM. Ångström, Billet, Dove, Grove, Henry, Jacobi, Lloyd, Riess, Stokes, Tyndall, Volpicelli, and Sir William Thomson.

THE Gresham lectures for the present week at the Gresham College, Basinghall Street, are by Dr. Symes Thompson, on the 2nd, 3rd, and 4th of June, at 7 P.M., on "The Epidemics of the Middle Ages," on "Sedatives," and on "Narcotics." They are free to the public, and will be illustrated with diagrams, tables, and chemical experiments.

THE municipal administration of Paris has decided on publishing a series of documents on the history of the capital. The commission appointed for this purpose has placed at the head of its programme a sketch of the pre-historic epochs, and has entrusted this labour to M. Belgrand, who is well known in the scientific world by his important works on the basin of Paris. In presenting to the Academy a *résumé* of his work, he divides it into four parts—the diluvian epoch, the great water-courses of the age of stone, the history of the peat-mosses, and the palæontological history of the basin of the Seine during the quaternary epoch. Our Common Council of London has a splendid opportunity of distinguishing itself in the same way; is it too much to expect of such an august body?

WE perceive with great pleasure that the Radcliffe Library at Oxford is being adapted more completely to the wants of students of science. Students in any department of natural knowledge, who need scientific works, maps, or plans which they do not find in the library, are invited to record their wants in a book kept for the purpose. There is a standard microscope, by Powell and Lealand, attached to the library, for the comparison of objects with the illustrated works of the library.

The Royal Dublin Society have commissioned Mr. Catterson Smith to paint a portrait of Dr. Joly, to be placed in their library. It will be remembered that Dr. Joly presented the Royal Dublin Society with a large and valuable library of modern books. The society already possessed a library of works on Science and Fine Arts, which, however, was very deficient in works of modern literature. It will now, with the addition of the Joly library, be one of the most useful public libraries in Great Britain and Ireland.

The Surgical Society of Ireland gave a grand *conversazione* to its members and to the medical men of Dublin on Tuesday, the 24th ult. His Excellency the Lord Lieutenant was present. The *conversazione* was held in the Royal College of Surgeons. The small museum of the college was lit up, and looked uncommonly well. A series of interesting microscopical objects were exhibited by Dr. Barker, Mr. William Archer, Rev. Eugene O'Meara, and others.

M. de Caligny called the attention of the French Academy, at its meeting of the 16th of May, to two prizes founded in 1867 by the Marquis d'Ourches, for the indications of the means of preventing people from being buried alive. The first is a prize of 20,000 frs. for the discovery of a simple method of recognising with certainty the signs of actual death. This method must be adapted to the capacities of the most ignorant. The second, a prize of 5,000 frs., is for the discovery of a means of recognising death by means of electricity or galvanism, or by some other process requiring knowledge for its application. These prizes are to be decided by the Imperial Academy of Medicine, within five years from the 22nd April, 1868.

One of the best signs of the times we have seen lately is the third annual report of the Rugby School Natural History Society for 1869, as giving satisfactory evidence of the interest taken in natural science by at all events a few Rugbeians. The botanical report for 1869 records the dates of flowering of 340 plants, which seem to have been carefully observed for three successive years, and a few new localities or plants new to the neighbourhood. We find also a thoroughly Darwinian paper by Mr. J. M. Wilson on "A remarkable instance of protective mimicry among the *Lepidoptera*;" the well-known example of the female of *Papilio Merope*, with an illustration; one on "English Snakes and the Blind-worm," by Mr. N. Masterman, secretary of the society; an elaborate account by Mr. J. M. Wilson of the "Drifts, Gravels, and Alluvial Soils of Rugby and its neighbourhood," illustrated by some carefully-executed drawings; a paper by the Rev. T. N. Hutchinson "On Spectrum Analysis and what it has done;" and one on "Norway," by Mr. Sedgwick. Other papers not reported appear to have been read at the meetings, which must have been interesting ones. We believe no greater service can be rendered to the spread of a taste for natural science than an encouragement of these efforts at our public schools.

A Natural History Society has been organised in Baltimore, to be called the Maryland Academy of Sciences; its object being to promote scientific research, and to collect, preserve, and diffuse information relating to the sciences, especially those connected with the natural history of Maryland. Its first president is Philip T. Tyson; Vice-president, Dr. John G. Morris; Corresponding Secretary, Dr. Charles C. Bombaugh.

The *Feuille des Jeunes Naturalistes* is a praiseworthy attempt by a small body of French naturalists to establish an international school journal of science and natural history for the boys of France, Germany, and England. Contributions, written in either of the three languages, are invited from any schoolboy; and they will be received from no other source. The proprietors are especially anxious to interest our English schools in their enterprise; and we gladly give publicity to a very novel and very admirable scheme. The subscription is four francs per annum. The editor is M. E. Dollfus, Dornach, Haut Rhin.

In reference to Mr. Murphy's communication in our last number respecting the purplish pink colour of the sunlight, we learn from correspondents that it was noticed also at Tynemouth, at 5 P.M., on Sunday, the 22nd ult.; at Cambridge, at 10 A.M., on Monday, and in Gloucestershire on both these days. In all these cases the sky is described as being hazy at the time.

The *American Gas-Light Journal* speaks of an invention which aims at the entire abolition of oils and all other lubricating material for boxes, slides, and every condition of motion where metallic friction is to be overcome or expected. It is claimed that such a result has been fully achieved, and there are engines now running with this material, which the proprietors aver have worked to complete satisfaction for weeks and months. It is the work of a scientific and practical gentleman, well known both in America and in Europe, who has spent a great many years in the study of physical forces and their effects, with especial reference to metals. The exact nature of the present invention cannot be given, for the reason that patents are being sought for in several countries in Europe, and any clear description of the materials and processes would be likely to defeat that end. It may, however, be said, in a general way, that the discovery—which has received the name of Metalline—consists of such combinations and manipulations of various metallic substances, as to make a surface on which the ordinary axles, cranks, pins, slides, &c., of iron, steel, brass, or any other metal, will run with much less friction, without heat that comes within the slightest possibility of danger, and without increase (in fact an actual decrease is claimed) of the motive power used. These, briefly, are the claims, and the inventor refers to a large number of trustworthy gentlemen who have examined and tried the thing, and speak from actual knowledge.

A movement is being set on foot in Germany for an alteration in the laws regulating the sending of dangerous substances by rail. Hitherto ether, alcohol, phosphorus, &c., can only be sent by special trains plying but once a week between the principal stations. Dry guncotton is entirely excluded from the railways; manufacturers are in the habit of sending it moistened with a certain quantity of spirits of wine; it thereby loses its explosive properties and burns like ordinary cotton.

We are glad to see "Cassell's Popular Educator" still devoting a large proportion of its space to science. In the June number articles occur devoted to the following natural sciences:—Ethnology, geology (illustrated with woodcuts, which we recognise as taken from well-known handbooks), botany (a continuation of a series of excellent elementary articles), mineralogy, meteorology, and the science of heat.

Dr. C. H. Schaible, of the Royal Military Academy, Woolwich, sends us "The State and Education," an historical and critical essay, with special reference to Educational Reform. The subject is exhaustively treated under the heads—Historical Sketch of State education; Compulsory Instruction; State Instruction; Organisation of State Instruction in Germany; Voluntary Instruction; State Control of Instruction; and Reform of Education in England; and the general conclusion arrived at may be stated to be the necessity of general, compulsory, unsectarian, primary instruction for all children from six to fourteen years of age, under State control, and gratuitous for the poor.

At a recent meeting of the French Horticultural Society, M. Duchartre gave a history of the investigations into the nature of the phenomenon of variegation. He considers it to be now completely established that variegation is of the nature of a contagious disease, which in the case of grafted plants can be communicated both from the stock to the graft and from the graft to the stock.

It has long been laid down as a maxim in botanical hand-books that variegation and double flowering never go together. Many botanists have, however recently doubted whether the law always holds good, and that the double phenomenon may sometimes occur appears now to be definitely established by an article contributed by Prof. Morren, of Liège, to the April and May number of the *Belgique Horticole*, in which he gives a description, accompanied by a drawing, of a wall-flower possessing both double flowers and variegated leaves. The plant has now been grown for several years by M. Em. Rodigas, of St. Trond.

M. Schutzenberger, Professor of Clinical Medicine at Strasburg, publishes an essay on higher instruction, in which he compares the system in vogue in France to those pursued in Germany, England, and America, and discusses the influence of the Napoleonic University system on the institutions for higher instruction.

Dr. R. Wolf, Professor at Zürich, reprints "The Discoveries of the Telescope, and their results in Astronomy," a lecture given at the public hall in Zürich.

From the same author we have a second part of a Manual of Mathematics, Physics, Geodesy, and Astronomy, copiously illustrated with woodcuts.

Professor Miquel, of the Hague, publishes the first part of a "Catalogus Musei botanici Lugduno-batavi," being a catalogue of the flora of Japan, with lists of the Japanese collections contained in the Leyden Herbarium.

The eighth volume of Dr. Frisch's collected works of Kepler, containing the "Collectanea ex codicibus Pulkoviensibus," the "Judicium matris Kepleri," and some smaller treatises, lies on our table.

A Magazine is now published at Heidelberg under the title *Annalen der Oenologie* devoted, entirely to the discussion of the cultivation of the vine and the manufacture of wine. It is edited by Dr. Blankenhorn and Dr. Rösler.

Perhaps the most extraordinary instance of excessive and depraved appetite on record is that of a French soldier, named Tarare, whose case is described in vol. XXI. of the *Dictionnaire des Sciences Médicales*, by Dr. Percy. He was born near Lyons, and came up to Paris, where his first exploit was to eat a basket of apples—at a friend's expense. On various occasions he swallowed a series of corks and other indigestible materials, which produced such violent colic that he was obliged to attend the Hotel Dieu, and whilst being examined almost managed to swallow the watch-chain and seals of the surgeon in attendance, M. Giraud. Desault, on the occasion of one of these attacks of colic, tried to frighten him out of his gross habits by declaring that it would be necessary to open his stomach, and arranged the instruments; he ran away, and relieved himself by copious draughts of warm water. Soon after he found that his appetite had really increased to an excessive amount, probably owing to the continued irritation produced by these absurd tricks. At 17 years of age, when only weighing 100lb., he could eat 24lb. of beef in as many hours. He now entered the army, and being recognised by the Surgeon-Major, M. Courville of the 9th Regiment of Hussars, he was detained for the sake of curiosity. From the day of his admission, he was ordered quadruple rations, with pickings and waste meat, but often slipped into the dispensary to finish off a poultice or two. One day he was observed to seize a large cat: and, after sucking its blood, left, in a very short time, only cleanly picked bones, the hair being rejected in the course of about half an hour, like other carnivora. He was fond of serpents and eels, swallowing them whole. On another occasion he consumed in a few minutes a repast, spread out for fifteen German workpeople, of milk, &c., after which he was blown out like a balloon. In the presence of some officers he swallowed, at one sitting, 30lb. of liver and lights. His insatiable appetite was for once in his life made useful, by his being selected to convey a correspondence between General Beauharnais and a French colonel, which was inserted in a box and swallowed; but he was caught and soundly thrashed. He fell under suspicion of having eaten a child fourteen months old. It is stated that he was of mild and gentle manners and aspect. After death his stomach was found in a very diseased condition.

The Tyneside Naturalists' Field Club is not only one of the most vigorous and truly scientific in the country, but is nearly the oldest, and probably one of the largest, numbering 600 members. At its 24th anniversary meeting recently held, the following gentlemen were elected as officers, viz.:—President—Mr. George S. Brady; Vice-Presidents—the Revs. W. Featherstonehaugh, B.A., J. F. Bigge, M.A., H. B. Tristram, LL.D., W. Greenwell, M.A., G. C. Abbs, M.A., A. M. Norman, M.A., J. C. Bruce, LL.D., A. Bethune, M.A., and R. F. Wheeler, M.A., Sir W. C. Trevelyan, Bart., Drs. Embleton and Charlton, and Messrs. R. B. Bowman, Richard Howse, George Hodge, Ralph Carr, R. Ingham, T. Sopwith, Rowland Burdon, George Wailes, and E. J. I. Browell. Treasurer—Mr. R. Y. Green. Local Secretaries—Durham, Mr. John Booth; Hexham, the Rev. W. T. Shields; Morpeth, Mr. W. Creighton. Committee—Messrs. Thomas Atthey, Jos. Blacklock, T. J. Bold, James Clepham, John Coppin, W. Dinning, D. O. Drewett, Albany Hancock, John Hancock, Jos. Watson, A. F. Marreco, and Dr. Philipson. Auditors—Messrs. J. S. Foster, and T. P. Barkas.

We have received from the Canadian Government Emigration Office a copy of the Year-Book of Canada for 1870, containing a vast mass of information respecting British North America, which will be very useful to those interested in the country. It also contains an interesting paper on the Climatology of British North America, written by Mr. G. T. Kingston, the director of the Magnetic Observatory at Toronto; an account of the Educational Establishments, by Mr. J. C. Patterson, of Ottawa; and a paper by Mr. T. Cross on Mining in Canada, both of which are of interest. One of the chief points in the latter paper is the statement that mining in Canada is every year assuming a more steady and settled character. The gold working in Nova Scotia has given less favourable results than in 1867, but the falling off is ascribed to the depth at which the lodes were being worked, and the inadequate nature of the machinery employed. The total yield in 1868 was 20,541 ounces; and the inspector expresses the opinion that gold mining in the province is yet far from that development which may be expected.

M. l'Abbe Vaullet, director of the hospital of Annecy, believes, says *Les Mondes*, that he has proved that the temperature of the department of Haute Savoie has gradually risen in a very appreciable manner during the last forty years. The mean temperature, formerly 8° to 9° C., now exceeds 10·5°. The proofs he adduces are the advance of the cultivation of the vine, and of grain, and the retreat of the glaciers. The causes of this amelioration of the climate M. Vaullet considers to be the disforesting, the destruction of hedge-rows, the clearing of uncultivated lands, the multiplication and maintenance of roads, the draining of marshes, and the increase of population and of cattle.

Dr. Thomas Andrews has recently delivered two lectures in the chemical lecture-room of Queen's College, Belfast—the first on carbon, the second on carbonic acid and carbonic oxide. They form a portion of a course of strictly scientific lectures, the attendance being confined entirely to working men, the admission by ticket, but without charge. On each occasion the hall was crowded.